

REMARKS/ARGUMENTS

The Examiner has again rejected a number of the claims under 35 U.S.C. 102(b) as being anticipated by Scholler et al., and other claims as being unpatentable over Scholler et al. under 35 U.S.C. 103(a). Applicant believes rejection is not well founded. However, it appears that the Examiner's broad interpretation of what the prior art teaches and Applicant's invention which is directed to the use of micromachined ultrasonic transducers is causing the difficulty. Applicant refers to the specification for a definition of "micromachined ultrasonic transducers". Referring specifically to page 4, lines 6-18, Applicant clearly describes micromachined ultrasonic transducers (cMUTs). Clearly when a claim is so interpreted, the Scholler reference does not teach a micromachined ultrasonic transducer. Nevertheless, Applicant has amended the claims to clearly state that the ultrasonic transducer is micromachined into one wall of the microchannel.

Applicant has carefully studied the Scholler et al. Patent 5,652,609 and the Examiner's comments. The electret 200 is a dielectric material which forms one wall of the channels 101-103. The electret is deformed by electrostatic forces resulting from the application of a voltage to the conductors 501-503 deposited and patterned on the base 500. Spacing element 300 with openings 310 separate the electret material from the conductors and form one wall of the channels 101-103. The electret moves responsive to applied pulses which are applied between the electret and the conductors. The movement of the electret wall displaces fluid by changing the volume defined by the channels 101-103 and ejects droplets of fluid through the openings 151-153. The electret in and of itself is not a transducer. The transducer is comprised of conductors 501-503, spacing elements 300 and electrets 200. The transducer is not formed in one wall. Rather the transducer is formed by three walls: the electret material, the spacing elements and the conductors. In the '609 patent the elements or transducer are not micromachined in the wafer 501-503.

Claim 1 has been amended to make it clear that the ultrasonic transducer is micromachined into one wall of the channel. Thus the entire transducer which emits ultrasound is fabricated in one wall of the channel. Clearly the claim is not anticipated by the '609 patent since the patent does not teach or suggest an ultrasonic transducer in its entirety formed in one wall, nor does it teach an ultrasonic transducer formed in one wall of a channel. Rather it teaches

an ultrasonic transducer in which one wall of the transducer is the moving element which ejects droplets.

Claims 3, 5/3 are not anticipated by the '609 patent. The electret 200 in the '609 patent is not an ultrasonic transducer, it is only part of such a transducer. Nor is it machined into the base but rather is carried by the base. The microgroove 310 does not define a channel but defines an open space. The channels are the openings 101-103 in the member 100.

Claims 6, 19 call for longitudinally spaced transducers. The transducers in the '609 reference are not disposed along a single channel. Furthermore, claims 6 and 19 when read in connection with the claim from which they depend clearly distinguish over the references since the reference does not show the claimed combination.

Claim 16 as amended calls for a capacitive micromachined ultrasonic transducer micromachined into one wall of the channel and a flexible membrane on the opposite wall opposite the transducer whereby ultrasonic waves from the ultrasonic transducer are reflected back to the transducer by the flexible membrane. Applicant has carefully considered the teaching in col. 5, lines 54-64 and can find no suggestion of a flexible membrane opposite the electronic transducer (opposite the electret). The electret is not a transducer but one element of the transducer and is the flexible membrane of the transducer.

Claim 18 is more specific than the foregoing claims and calls for a silicon base with one or more capacitive micromachined ultrasonic transducers micromachined into said base and a top having a microgroove sealed to the base with the microgroove over the capacitive micromachined transducer. Clearly the '609 patent does not teach or suggest a capacitive transducer micromachined in the base.

Claims 20, 21 are rejected because the Examiner states that the '609 patent teaches a processor 600 for operating the transducers in a pulse echo mode. Nowhere in the description of the '609 patent is there any suggestion of using or operating transducers in a pulse echo mode.

Claim 22 is rejected on the basis that the '609 patent shows a compliant membrane in Figure 2. Applicant is unable to find such a teaching. The compliant membrane, if any, is the electret.

Claims 2, 4, 5/4, 7, 8, and 15 are rejected on the basis that the provided dimensions would be obvious to one having ordinary skill in the art performing routine experimentation. However,

these claims all depend from claims which have been discussed and are allowable for the same reason. Therefore claim 5/4 is not met by the Scholler et al. reference in that it depends from an allowable claim. Claim 15 is patentable for the same reason as the claims from which it depends since the combination called for in claims 3 and 4 is not suggested or taught in the Scholler et al. reference.

A number of the claims are rejected on the basis of modified Scholler. However, modified Scholler does not disclose transducers micromachined into a base to form ultrasonic transducers, nor does Scholler et al. disclose microgrooves including a compliant membrane.

Claims 23 and 26/5/3 are rejected as being anticipated by the combination of Scholler et al. and Hawkins. Hawkins teaches a resistive element for mixing fluids within a channel. Scholler et al. discloses an ultrasonic transducers which is not integrated or micromachined into a channel, and the combination of the two does not suggest Applicant's combination as set forth in claims 23 and 26. The combination of Scholler and Hawkins is not suggested by either of the references and clearly would not be obvious to one skilled in the art. There is no teaching in the primary reference of a micromachined ultrasonic transducer micromachined into one wall of a channel.

In view of the above, favorable action is respectfully requested.

The Commissioner is hereby authorized to charge any other fees determined to be due to Deposit Account 50-2319 (Order No. A-69570/AJT(468330-1249)).

Respectfully submitted,


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